MECHATRONICS BOOK SERIES

SYSTEM DESIGN AND SIGNAL PROCESSING

VOLUME 2

Editors
Md. Raisuddin Khan
Md. Mozasser Rahman
Muhammad Mahbubur Rashid
Shahrul Na'im Sidek

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CHAPTER 1

A BRIEF OVERVIEW OF BIOMECHATRONICS AND ITS APPLICATIONS

Nur Izatulnisha A. Rashid [a], Jamaliah Kassim [b] and Asan G. A. Muthalif [c]

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1.1 Introduction

"The Six Million Dollar Man" is a very popular TV series in which the scientists restore a crippled test pilot, who lost legs, one arm and an eye. In this series, the scientists are shown to have the relevant technology, thus they rebuild the injured pilot and give him superhuman qualities. Although the technology used in this TV series is total science fiction, however, modern robotics is inching ever closer to fulfill this vision [1]. Modernization of the era, has allowed the scientists to develop such technology; the so called "fiction" in the series by adopting biomechatronics approach in its design. As biomechatronics seem to give much credit to humanity, thus recently, many researchers put much effort into this field and come out with various new, useful and natural biomechatronics devices. For instance, in the year 2006, Dr. Todd Kuiken at the Rehabilitation Institute of Chicago developed a prosthetic arm for Claudia Mitchell, a former Marine and amputee, who lost her arm in a battle [2].

In this chapter, some discussion on Biomechatronics will be point out. The rest of the chapter is organized as follows; section 1.2 gives an overview of Biomechatronics and the components embedded in the system. This is followed by the applications and prospects of Biomechatronics in section 1.3. The continuing section is on its advantages and disadvantages, and finally the conclusion.

1.2 Biomechatronics and Its Components

Biomechatronics itself merges two major professional disciplines namely biology and Mechatronics. Biology is the science of life and living organisms. These sciences deal with the origin, history, structure, development, and function of living organisms, their relationships to each other and their environment, and the differences between living and non-living organisms [3]. On the other hand, Mechatronics is an engineering discipline that attempts to integrate technologies from mechanical engineering, electronics, and computer software and hardware in order to design and create flexible "smart" machines. Mechatronics is closely related to robotics, but covers relatively less complex systems such as intelligent door locks, cameras, photocopiers, and washing machines [4]. Thus, as combination of both professional fields, Biomechatronics is defined as:

> "An applied interdisciplinary science that aims to integrate mechanical elements, electronics and parts of biological organisms. Biomechatronics includes the aspects of biology, mechanics, and electronics. It also encompasses the fields of robotics and neuroscience [5]."